

Claims

[c1] 1. An electrically conductive self-lubricating bearing system comprising:

a mating structure having a mating surface;

an electrically conductive substrate, wherein said substrate includes a substrate surface having a plurality of valleys defined by at least one electrically conductive rib extending therefrom; and

a lubricating material, wherein said lubricating material is disposed within said plurality of valleys, an exposed surface of said lubricating material substantially flush with an end defining a length of said rib so as to be communicated with said substrate surface and said mating surface, wherein said rib is in electrical communication with said mating surface.

[c2] 2. The system according to claim 1, wherein said mating structure is constructed of metal.

[c3] 3. The system according to claim 1, wherein said mating structure is constructed of metal having one of hardened corrosion resistant steel, stainless steel, and metallic substrate that has been one of chrome plated, plasma sprayed and high velocity oxy fuel (HVOF) coated.

- [c4] 4.The system according to claim 1, wherein said substrate is constructed of a metallic material having corrosion resistant properties.
- [c5] 5.The system according to claim 4, wherein said metallic material includes one of copper nickel tin, beryllium copper, aluminum nickel bronze, copper, brass, aluminum, and corrosion resistant steel.
- [c6] 6.The system according to claim 1, wherein said lubricating material is constructed of polymer resin.
- [c7] 7.The system according to claim 1, wherein said lubricating material is constructed of one of Teflon®, PTFE material, and graphite material.
- [c8] 8.The system according to claim 1, wherein said lubricating material is capable of operating in thermal environments from about -200°F to about +700°F.
- [c9] 9.The system according to claim 1, wherein said lubricating material is a fabric including at least one of lubricating thread and lubricating fiber woven together with other threads and combined with a resin in one of liquid form and prior to B-staging of said resin on said fabric.
- [c10] 10.The system according to claim 9, wherein said other threads include at least one of polyester, cotton, nylon,

arimid, glass fiber, and carbon fiber.

- [c11] 11. The system according to claim 1, wherein said lubricating material including a polymer resin including lubricating particles embedded within the polymer resin, said lubricating material adhesively bonded to said substrate.
- [c12] 12. The system according to claim 11, said lubricant particles including polytetrafluorethylene (PTFE), fluorinated ethylene propylene (FEP), molybdenum disulfide, molybdenum, graphite, and polyester.
- [c13] 13. The system according to claim 11, wherein said polymer resin is made from one of epoxy, polyimide, urethane, acrylic, polyester, and phenolic.
- [c14] 14. The system according to claim 1, wherein said substrate has a uniform roughness.
- [c15] 15. A method for implementing an electrically conductive self-lubricating bearing system comprising:
 - defining a plurality of valleys within a metallic substrate surface with at least one electrically conductive rib extending therefrom;
 - cleaning said substrate surface so as to remove impurities from said substrate surface;
 - bonding a lubricating material to said substrate surface so as to dispose a film of said lubricating material on

said substrate surface, said lubricating material including a polymer resin including lubricating particles embedded within the polymer resin;
curing said lubricating material to adhesively bond said lubricating material to said substrate;
removing any at least one of said lubricating material and extending rib such that an exposed surface of said lubricating material is substantially flush with an end defining a length of said rib; and
associating said substrate with a mating structure having a mating surface, wherein said mating structure is disposed relative to said substrate such that said lubricating material is disposed between said substrate surface and said mating surface, said rib in electrical communication with said mating surface.

[c16] 16.The method according to claim 15, wherein said lubricating material is a fabric including at least one of lubricating thread and lubricating fiber woven together with other threads and combined with a resin in one of liquid form and prior to B-staging of said resin on said fabric.

[c17] 17.The method according to claim 15, wherein said defining includes machining recesses in said metallic surface in any pattern.

- [c18] 18.The method according to claim 17, wherein said any pattern includes one of concentric rings, a helix, a course thread pitch, and a diamond pattern.
- [c19] 19.The method according to claim 15, wherein said defining includes chemical etching.
- [c20] 20,The method according to claim 15, wherein said machining includes one of sanding, polishing, and light machining excess lubricating material disposed over said end defining said length of said rib.